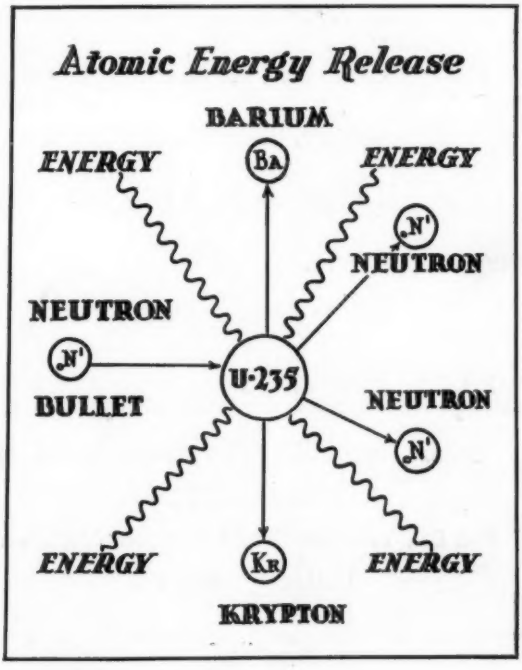
American Journal of Pharmacy

AND THE SCIENCES SUPPORTING PUBLIC HEALTH



A slow neutron causes Uranium-235 to split or fission into two parts, releasing tremendous amounts of energy. According to Einstein's Law the energy released per pound of U-235 used, is about 11,400,000,000 Kilowatt-hours.

$$(\text{Energy}) = (\text{Mass}) \times (\text{Velocity of Light})^2$$

Since 1825 *April 1946*

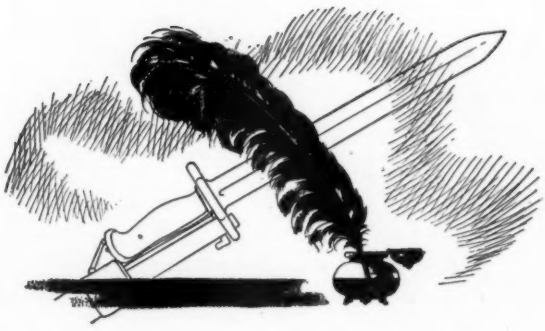
American Journal of Pharmacy

Published monthly by the Philadelphia College of Pharmacy and Science
43d Street, Kingsessing and Woodland Avenues, Philadelphia 4, Pa.

Annual Subscription, $3.00 — Foreign Postage, 25 Cents Extra
Single Numbers, 30 Cents — Back Numbers, 50 Cents

Entered as Second-Class Matter March 27, 1937, at the Post Office at Philadelphia, Pa.
Under Act of March 3, 1879

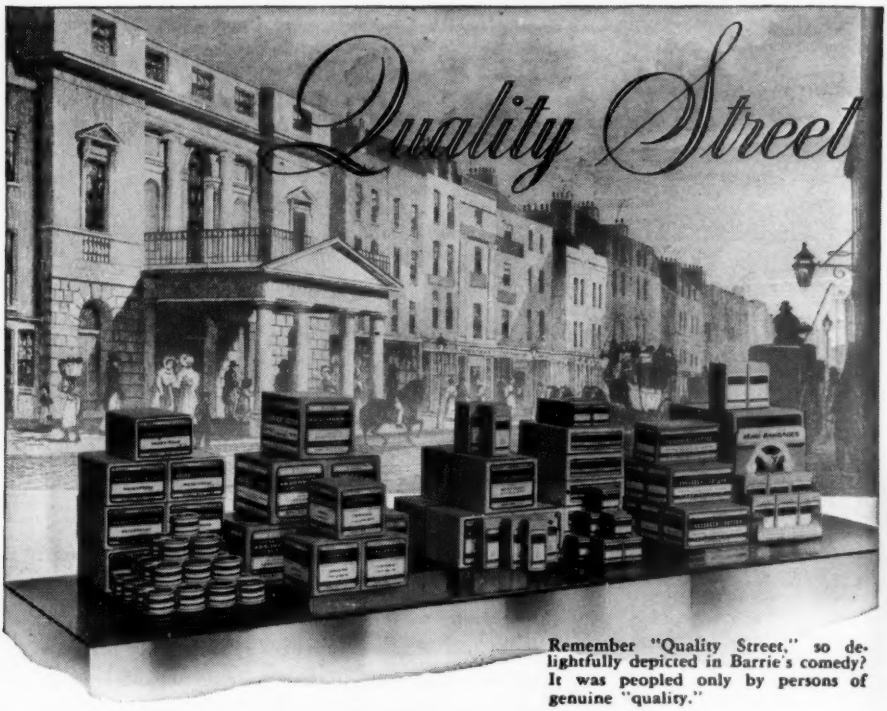
RESOLUTION



Free men have always been glad to set aside the sword in favor of the pen. The sword has traditionally represented all that democracy abhors, particularly the imposition of rule over others by violence or threats of violence. Exponents of democracy do not subscribe to the axiom "Might makes right." Democratic principles are championed by thoughful men who guide others by the logic of the written and spoken word. Today these men are more than ever resolved to extend the boundaries of freedom through peaceful discussion and education.

Every retail drug store, however small, is an outpost of democracy. The Lilly Policy was instituted to insure the survival of the retail pharmacist as an essential element of democratic economy. It is intended to provide the help and guidance needed to secure his future. Pharmacists who carry complete but well-controlled stocks of the finest medicinal products, who consistently give quick courteous service, who co-operate wholeheartedly with physicians, are applying the principles of the Lilly Policy. In so doing they not only assure success for themselves but also reflect credit upon their profession and the communities in which they operate.

ELI LILLY AND COMPANY • INDIANAPOLIS 6, INDIANA, U. S. A.



Remember "Quality Street," so delightfully depicted in Barrie's comedy? It was peopled only by persons of genuine "quality."

Counters of your pharmacy become a Quality Street of Surgical Dressings when you display professionally-recognized Parke-Davis Adhesive Plasters . . . Gauze Bandages . . . Absorbent Gauze . . . Absorbent Cotton . . . Readi-Bandages.

They are *quality* products. Only the finest materials procurable are used in manufacture. Through a series of rigid tests, Parke-Davis Surgical Dressings are made to conform to highest standards of sterility and strength. A variety of styles and sizes meet all medical and first aid requirements.

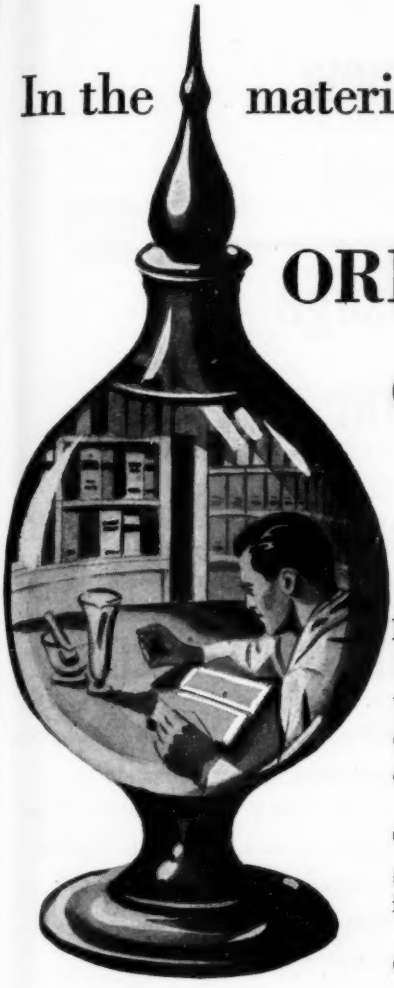
Physicians and surgeons everywhere appreciate Parke-Davis Surgical Dressings—true Quality Street products.

Parke-Davis SURGICAL DRESSINGS

PARKE, DAVIS & COMPANY

DETROIT 32 • MICHIGAN

In the materia medica of modern endocrine therapy



ORETON.

ORETON-M

ORETON-F

SCHERING'S MALE SEX HORMONE PREPARATIONS

What better criterion of the effectiveness of ORETON can there be than the steadily increasing demand for it?

ORETON preparations provide potent androgenic therapy as evidenced by their position in the forefront of the male sex hormones.

ORETON is indicated in male sex hormone deficiency such as the male climacteric and impotence due to androgenic deficiency. In the female, ORETON is effective for the immediate control of functional uterine bleeding, for intractable primary dysmenorrhea and for the inhibition of lactation.

SCHERING

Schering CORPORATION

BLOOMFIELD, NEW JERSEY

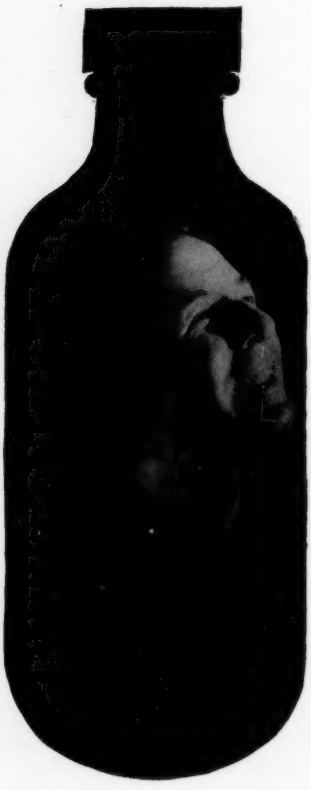
In Canada, SCHERING CORPORATION LTD., MONTREAL

ORETON: testosterone propionate in oil for intramuscular injection.

ORETON-M: methyl testosterone in tablets and ointment.

ORETON-F: free testosterone in pellets for subcutaneous implantation.

a new liquid dosage form



Available in 6 fl. oz. bottles

Benzedrine Sulfate—formerly supplied in tablet form only—is now available also as:

BENZEDRINE SULFATE ELIXIR

Benzedrine Sulfate Elixir, N.N.R.—highly palatable, pleasant in appearance and easily tolerated—is identical in action with Benzedrine Sulfate Tablets. It is a preferred form of administration for invalids, convalescents, children and the aged. This new preparation contains Benzedrine Sulfate (racemic amphetamine sulfate, S.K.F.), 2.5 mg. per 5 cc. (1 teaspoonful); and has the same pharmaceutical properties as low-alcoholic, mildly acidic elixirs.

NOTE: When you next write for Benzedrine Sulfate, please remember to specify which of the two dosage forms you wish to prescribe—'Tablets' or 'Elixir'.

Smith, Kline & French Laboratories, *Philadelphia, Pa.*

AMERICAN JOURNAL OF PHARMACY

AND THE SCIENCES SUPPORTING PUBLIC HEALTH

Since 1825

Vol. 118. APRIL, 1946 No. 4

CONTENTS

PAGE

Editorial:

Warning Statements on Prescriptions. By L. F. Tice 114

Articles:

An Investigation of Brazilian Sassafras Oil. By A. A. Dodge 116

Render Unto Caesar. By T. Swann Harding 126

Fifty Years of Atomic Energy. By George Rosengarten . 132

Atomic Power and Disease. By Ivor Griffith 137

Selected Abstracts 145

Solid Extracts 150

Book Reviews 152

EDITORIAL

WARNING STATEMENTS ON PRESCRIPTIONS

THE recent ruling by the Food and Drug Administration, as expressed in TC 6-A, establishes a precedent that must not go unchallenged if the practice of medicine and the time-honored relationship between the patient and the physician is to remain on its current basis. This opinion by Commissioner Dunbar states that the warning label placed on Thiouracil is not to be removed when this drug is dispensed on prescription. The position is taken by the Food and Drug Administration that the warning statement is ". . . necessary for the protection of patients who are under the physician's care." No endorsement of such a warning label by the prescribing physician is required and, in fact, the pharmacist, according to official ruling, is not permitted to omit the warning label even when so directed by the physician.

This ruling by the Food and Drug Administration does not in itself work any hardship on pharmacy but as pharmacists, who are keenly interested in the welfare of our sister profession, medicine, we wonder whether the full significance and impact of this revolutionary action is fully appreciated. For the first time in history government has taken the position of superseding the prerogative of the physician in safeguarding the patient's welfare and of injecting itself as arbiter of what is best for the patient. True this is but a small detail but might it not be an entering wedge to be followed by greater and greater regulatory rulings until the practice of medicine finds itself beset by rules and regulations such as now bind and hamper most of our non-professional vocations and industries.

The effect of such warning statements on the psychology of the patient can easily result in serious consequences. Let us take for a moment the patient with thyrotoxicosis—pulse rapid, hypertensive and in a severe emotional unbalance and let the patient read this label placed on his prescription by the ruling of a paternalistic government to protect him from damage at the hands of his physician—**"Warning—**This drug may impair resistance to infection. The physician should be consulted at the first sign of sore throat, fever or

any illness during treatment with Thiouracil." Will such a label do other than upset and so disturb the patient that his general condition becomes worse? Will not the patient's confidence in his physician's judgment be shaken? Are physicians such a careless lot that their patients under such drastic therapy as thiouracil need governmental warnings lest they succumb through their physician's negligence? We believe not.

The profession of medicine in this country now has the confidence and esteem of the public. This ruling is, in essence, an indictment of the attention given the patient by his physician and as such it will undermine ever so slightly that confidence. If it is allowed to pass by default still others will soon come about and with each default the likelihood of turning the tide becomes less. The public will have learned to look to government and not to the medical profession for protection, and regimentation of medical practice is then a certainty.

It is indeed strange how soon the meaning of liberty is forgotten in captivity and how soon regimentation becomes accepted as inevitable. In this issue pharmacy must look to medicine for its answer —What shall it be?

L. F. Tice.

AN INVESTIGATION OF BRAZILIAN SASSAFRAS OIL

A Comparison With Oil of Sassafras U. S. P. in Regard to Taste and Odor Preference

By A. A. Dodge, Ph. D.*

Introduction

IN recent years a sassafras oil of Brazilian origin has appeared in commerce. This product is said to be obtained by the steam distillation of the wood of *Ocotea pretiosa* Benth. & Hook. f. (Fam. *Lauraceae*).

It thus originates from a source entirely different from the sassafras oil recognized by the U. S. P. (1), which is obtained by the steam distillation of the root of *Sassafras albidum* (Nuttall) Nees (Fam. *Lauraceae*).

At the present time the Brazilian oil may be used only for technical purposes, e. g., the synthesis of heliotropin from the safrol it contains. It differs, physically, from the official sassafras oil in that its specific gravity is greater, its refractive index higher, and in being slightly laevorotatory. Data on these constants, together with the results of an investigation of its chemical composition, will appear in a subsequent paper.

Experimental

In order to gain information as to the acceptability of the non-official Brazilian sassafras oil for flavoring purposes, taste tests of aromatic waters prepared from this oil and odor tests of an alcoholic spirit (5 per cent) and of the original oil were conducted on a group of twenty-eight individuals who volunteered for this investigation. Members of this group were chosen from the faculty, the student body, and the janitorial staff of the Philadelphia College of Pharmacy and Science.

For purposes of comparison, identical tests were conducted on Oil of Sassafras U. S. P. Each test subject, therefore, had the

* Associate Professor of Pharmacy, Philadelphia College of Pharmacy and Science.

opportunity to determine his preference in a series of five tests, each of which consisted of one pair of products, as follows:

Taste Tests

1. Aromatic Water, full strength, prepared according to the method of the U. S. P., Process *b* (2), in which 2 cc. of the oil are used per 1000 cc. of finished preparation. In order to accentuate the flavor of the oil, 5 per cent of sucrose was added to the product.

2. Aromatic Water, half strength. This was prepared by diluting the full strength water with an equal volume of 5 per cent solution of sucrose.

3. Aromatic Water, quarter strength. This was prepared by diluting one part of the original water with three parts of a 5 per cent solution of sucrose.

In each of the taste tests the size of samples was approximately 0.5 cc. for the full strength and half strength waters, and 1 cc. for the quarter strength.

Odor Tests

4. Original Oil, one or two drops on a piece of filter paper.

5. Alcoholic Spirit, containing 5 per cent of each oil in 95 per cent alcohol. Two or three drops were placed on filter paper, and the alcohol was allowed to evaporate spontaneously for one or two minutes in order that the odor of the oil should not be masked by that of the alcohol.

The full strength Aromatic Waters were prepared in sufficient amounts for all of the tests. From these the dilutions were made in smaller amounts (30 to 50 cc.) as required. Not all individuals received a particular test on the same day; thus, some tasted the full strength water on the same day it was finished, and others received it when it was twenty-one to twenty-eight days old, and in two instances at thirty-five and thirty-nine days, respectively. At no time was there any evidence of a deterioration of the full strength waters in taste or odor because of mold formation; no doubt the absence of mold is due to the marked preservative action of Oil of Sassafras, whether official or of Brazilian origin.

During these tests the identity of the samples was disguised as follows:

	Brazilian Oil	Official Oil
1. Aromatic Water, full strength	"B"	"A"
2. Aromatic Water, half strength	Red Label	Blue Label
3. Aromatic Water, quarter strength	"Y"	"X"
4. Odor Test of original Oil	"II"	"I"
5. Odor Test of 5 per cent Spirit	"Z"	"M"

Because of the possibility that a subject might be influenced by the order in which he examined a given pair of samples, the order was usually varied from one test to another; that is, if in one taste test he had sampled first the aromatic water prepared from the Brazilian oil, then in the next test he was handed first that prepared from the official oil.

In the following tabulation of the data collected, the two oils are identified throughout as follows: "A" for the official, "B" for the Brazilian, in order to simplify examination of the results. The comments of the subject are reproduced as given. In a few instances the subject could not put into words the reason for his preference.

The age of the full strength Aromatic Water at the time of tasting by each subject is stated in each case.

Tabulation of Results of Taste and Odor Tests

Subjects 1-10 inclusive were faculty members; No. 11 was a graduate student; No. 12 was a janitor (of whom it may be of interest to mention that he was accustomed as a boy to drink "Sassafras tea" prepared from American grown sassafras); No. 13-28 inclusive were students.

Abbreviations: The various Aromatic Waters are identified as follows: Full strength, "F. S."; half strength, "H. S."; quarter strength, "Q. S."; the original oil, "Oil"; the 5 per cent alcoholic spirit, "Sp." "A" represents the official Oil of Sassafras, or any product prepared from it; "B" similarly represents the Brazilian oil or its preparations. "Age, days" refers to the age of the full strength water.

Subject	Preference	Age, days	Comment
1	F.S.—B	0	No comment
	H.S.—B		"A" has camphoraceous taste
	Q.S.—B		Difference is detectable, but not pronounced
	Oil—B		"A" yields its odor faster; "B" seems spicier
	Sp.—B		"A" has a definite obnoxious odor
2	F.S.—B	0	"A" has camphoraceous taste
	H.S.—B		"B" tastes more phenolic
	Q.S.—A		"B" tastes "flat"
	Oil—B		"A" is too peppery; "B" is fainter
	Sp.—None		Appeared identical
3	F.S.—B	28	"B" has a fuller taste than "A"; "A" is flatter
	H.S.—B		"B" has a better bouquet than "A"
	Q.S.—A		Not a great deal of difference
	Oil—None		"A" has an odor of some constituent which is lacking in "B"
	Sp.—None		Difference not detectable
4	F.S.—B	1	"B" has a "smoother" taste
	H.S.—B		"A" is more pungent and has more "sassafras taste" like that of sassafras tea
	Q.S.—A		"A" is "smoother"; difference not great
	Oil—A		"B" has a peculiar odor at first, followed by a more pleasant odor. "A" seems to have an "aged" sassafras odor
	Sp.—A		"A" is more pleasant and gentle; "B" is more pungent
5	F.S.—A	1	Taste of "A" more pronounced and characteristic of sassafras; "B" is sweeter
	H.S.—None		Taste of "B" very fleeting; that of "A" lingers longer. Not much difference in intensity
	Q.S.—None		Taste of "A" is more intense immediately, but is soon lost; taste of "B" is more lasting
	Oil—B		"A" has an undesirable, birch-like or empyreumatic odor
	Sp.—B		"B" gives the impression of being a more highly refined oil; i. e., "A" contains something undesirable that has been removed from "B"

Subject	Preference	Age, days	Comment
6	F.S.—B	1	"B" has a more pronounced sassafras taste; "A" seems weaker
	H.S.—B		"A" seems more phenolic; "B" is milder
	Q.S.—A		"B" seems flat and somewhat disagreeable
	Oil—A		"A" is smoother; "B" has a sharper odor, as though there were an irritating constituent present
	Sp.—B		"B" has a smoother odor than "A": "A" is sharper
7	F.S.—A	1	Taste of "A" is "rounder" and sweeter than that of "B"; "B" is "flatter"
	H.S.—None		"B" seems stronger
	Q.S.—(1) A		"A" is pleasant tasting, while "B" has an almost repulsive taste
	(2) B		"B" has a "fuller" taste (Note: in this test the subject was given a repetition after about two weeks)
	Oil—A		"B" seems to have a more pronounced odor, but "A" is preferable
	Sp.—B		"A" has a more pronounced odor than "B" (subject does not like strong odors)
8	F.S.—B	25	"A" has an unpleasant, resinous aftertaste
	H.S.—B		"B" has a more "sassafrassy" taste
	Q.S.—B		Terebinthinate taste of "A" is now almost absent
	Oil—B		"B" has a fragrant, "sassafrassy" odor; "A" has a rank, "off" odor
	Sp.—B		"B" is fragrant and purely a sassafras odor; "A" has a disagreeable odor in addition to the sassafras odor
9	F.S.—A	1	Taste of "B" is more lasting, and since subject does not like a "lasting" taste, he preferred "A"
	H.S.—A		"B" seems stronger—has a slight burning sensation on tongue
	Q.S.—None		"A" seems stronger than "B," but subject had no preference
	Oil—None		One seems as pleasant as the other
	Sp.—None		Samples smelled practically identical

Subject	Preference	Age, days	Comment
10	F.S.—B	21	No comment
	H.S.—A		"A" seems more pungent than "B"
	Q.S.—A		Difference is not great
	Oil—A		"A" has a more pronounced odor
	Sp.—B		"B" has a more pronounced odor
11	F.S.—B	0	"A" has a camphoraceous or ether-like taste
	H.S.—B		"A" has an after-taste
	Q.S.—B		"A" has a camphoraceous after-taste
	Oil—B		"A" has a sort of "side odor"
	Sp.—A		"B" has a sharper odor; "A" is more pleasant
12	F.S.—A	1	No comment
	H.S.—B		"B" tastes more like sassafras tea
	Q.S.—B		Both have a pleasant taste, but that of "B" is a little more pronounced
	Oil—A		No comment
	Sp.—B		"B" has more of a sassafras odor
13	F.S.—None	0	"A" is a little stronger, but subject had no preference
	H.S.—B		"B" has a sweeter taste. "A" has a secondary taste, but not undesirable
	Q.S.—B		"B" is sweeter; "A" has an after-taste
	Oil—None		"A" is stronger; otherwise the oils were the same
	Sp.—B		"A" has an undesirable secondary odor
14	F.S.—B	1	No comment
	H.S.—A		Flavor of "B" is noticeable immediately; that of "A" is not so marked at first, but becomes more pronounced later
	Q.S.—A		Taste of "A" is more pronounced than that of "B"
	Oil—B		"A" has an undesirable, camphoraceous odor
	Sp.—None		Difference not detectable
15	F.S.—B	21	"B" is stronger than "A"
	H.S.—A		"A" is stronger; "B" has "pasty" taste
	Q.S.—B		"A" has a slight, unpleasant after-taste
	Oil—B		"A" has unpleasant secondary odor
	Sp.—B		"B" is more pleasant; "A" has an unpleasant secondary odor

Subject	Preference	Age, days	Comment
16	F.S.—None	21	Taste about the same
	H.S.—A		"B" seems sweeter
	Q.S.—B		"A" has too sweet a taste
	Oil—A		"A" seems sweeter and stronger than "B"
	Sp.—None		"B" seems a little stronger
17	F.S.—A	25	"B" seems sweeter; subject does not like too sweet a taste
	H.S.—A		"A" seems less sweet, though "B" has more of a sassafras taste
	Q.S.—None		Taste alike; impossible to differentiate
	Oil—B		"B" has a sweeter odor
	Sp.—B		"A" has an odor not possessed by "B"
18	F.S.—B	21	"A" leaves an unpleasant taste
	H.S.—B		"B" tastes better
	Q.S.—None		Cannot detect any difference
	Oil—B		"A" has a little too strong an odor; "B" is more appetizing
	Sp.—B		"B" is appetizing, more pleasant, and has a stronger sassafras odor
19	F.S.—B	35	"B" tastes sweeter than "A"
	H.S.—B		"B" seems to be tastier
	Q.S.—B		"B" has a sharper taste
	Oil—A		"A" has a more pronounced odor than "B"
	Sp.—A		"A" is stronger but less pungent
20	F.S.—B	0	"B" is more pleasant to the taste; not a great deal of difference
	H.S.—None		"B" is sweeter. "A" has a parching effect on the taste
	Q.S.—A		"B" is sweeter; subject does not like a sweet taste
	Oil—B		"A" possesses some undesirable odor not present in "B"
	Sp.—B		"B" has a more pleasant odor, though "A" is stronger. "A" does not have a "pure" odor
21	F.S.—B	1	Taste of "A" resembles that of postage stamp mucilage
	H.S.—B		"A" has an unpleasant taste
	Q.S.—B		"A" has a taste "like that of medicine"
	Oil—A		Odor of "A" seems more pleasant; "B" was reminiscent of taste of "A" in the preceding test
	Sp.—A		Odor of "A" reminded subject of that previously preferred

Subject	Preference	Age, days	Comment
22	F.S.—B	0	"A" has a camphor-like taste
	H.S.—B		"A" has an undesirable camphoraceous taste
	Q.S.—B		"B" has a sweeter taste
	Oil—A		"A" produces a burning sensation in the nose
			"B" has odor reminiscent of that of bologna, which subject does not like
	Sp.—A		"A" has appetizing odor; "B" is weaker
23	F.S.—A	21	"A" is stronger
	H.S.—A		"A" seems stronger
	Q.S.—B		"B" is stronger and has a better flavor
	Oil—A		"A" has a stronger odor
	Sp.—B		"B" has a stronger, more pleasant odor
24	F.S.—B	21	"B" seems stronger
	H.S.—A		"A" seems stronger and more pleasant to taste
	Q.S.—None		Difference is very slight
	Oil—A		"A" seems stronger than "B" and has an appetizing odor
	Sp.—None		"A" is more potent than "B"
25	F.S.—A	21	No comment
	H.S.—None		No perceptible difference
	Q.S.—B		"B" has a sharper taste
	Oil—A		"A" has a cleaner, more pungent odor
	Sp.—B		"B" has a cleaner, more lasting odor
26	F.S.—None	25	No comment
	H.S.—B		Not much difference; "A" has unpleasant after-taste
	Q.S.—B		"B" is stronger; "A" seems sweeter
	Oil—B		"B" seems stronger than "A"
	Sp.—B		"B" is stronger than "A"
27	F.S.—None	39	Subject notes a difference, but has no preference
	H.S.—B		"B" has a more pronounced taste
	Q.S.—A		"A" has a more pronounced taste, and is slightly preferable
	Oil—B		"B" has a more pronounced odor
	Sp.—A		"A" has a more appetizing odor; "B" is faint
28	F.S.—B	1	"A" is more pungent; "B" is sweeter
	H.S.—B		"B" is sweeter; "A" seems "flatter"
	Q.S.—None		Can detect no difference
	Oil—A		"A" seems sweeter in odor
	Sp.—A		"B" is too pungent

The following is a summary of the taste and odor preferences of the twenty-eight subjects:

A = Oil of Sassafras U. S. P.
B = Oil of Sassafras Brazilian
N. P.= No preference

Taste Tests on Aromatic Waters

	Full Strength			Half Strength			Quarter Strength	
	No. of Subjects	Per cent		No. of Subjects	Per cent		No. of Subjects	Per cent
A	7	25.0	A	8	28.6	A	8	29.7
B	17	60.7	B	16	57.1	B	13	48.1
N. P.	4	14.3	N. P.	4	14.3	N. P.	6	22.2
	28	100.0		28	100.0		27	100.0

Odor Tests

	Original Oil			Alcoholic Spirit	
	No. of Subjects	Per cent		No. of Subjects	Per cent
A	13	46.4	A	7	25.0
B	12	42.9	B	15	53.6
N. P.	3	10.7	N. P.	6	21.4
	28	100.0		28	100.0

Discussion

It will be observed that only twenty-seven, instead of twenty-eight, observations are included in the taste tests on the quarter strength aromatic waters. The observations of one subject are not included in this tabulation for the reason that there was a reversal of preference upon a repetition of this test. Possibly this might be interpreted as an indication of no preference of taste, but it was thought more accurate to discard this result in the computation of percentages.

It will be noted that there is a marked preference for the flavor of the Brazilian oil in all of the taste tests. The same results were noted in the odor test on the spirit. In the odor test on the original oils, the preference was almost equally divided.

Inasmuch as these tests were conducted for the purpose of determining whether the Brazilian oil would prove acceptable in flavor and odor on equal terms with the official product, it would appear that those subjects who expressed no preference might be included, for all practical purposes, with those who definitely preferred the Brazilian oil. If this were done, the choice would be even more markedly in favor of this non-official product.

Summary

A comparison of the respective odor and flavor qualities of two types of Oil of Sassafras, namely, the non-official Brazilian and the official product, has been made by tests on twenty-eight subjects. Aromatic waters prepared by the U. S. P. XII procedure and sweetened by the addition of 5 per cent of sucrose in order to accentuate the flavor of the oil were administered in doses of from approximately 0.5 cc. to 1 cc. The taste preferences of the subjects for full strength, half strength, and quarter strength aromatic waters were noted.

In addition, odor tests on the original oils and on alcoholic spirits containing 5 per cent of the respective oils were performed by placing a few drops of the test preparation on filter paper.

A marked preference was exhibited for the taste of the aromatic waters prepared from the Brazilian oil and for the odor of the alcoholic spirit containing this oil. In the case of the original oils, odor preference was divided almost equally among the subjects.

REFERENCES

(1) *Pharmacopoeia of the United States of America,* Twelfth Revision, p. 336.

(2) *Ibid.,* p. 62.

RENDER UNTO CAESAR

By T. Swann Harding

THERE was once a young man who fell heir to four hundred thousand dollars. Naturally that wasn't enough, so he wanted to double his money. But to make money, he naively supposed, required special knowledge, business acumen, or some extraordinary capability. Anyway he asked the advice of an elderly lawyer he could now afford to consult. The lawyer wearily doodled on a five hundred dollar bill as he gave his advice. He said:

"You want to double your money. That is very easy and very simple, if you will do exactly as I say. Go to a good medical or pharmaceutical library. Get a book of formulas. Turn to dentrifrices and pick out a formula you happen to like, it doesn't much matter what as none of them will probably injure teeth or gums. Copy it down. Give a chemist fifty thousand dollars to make it up for you. Turn the other three hundred and fifty thousand over to a really good advertising agency. Thus, given just a little time, you will double your money."

We are told that this young man was wise and he did as directed. He doubled his money many times and perhaps you or I this morning used the dentrifrice in question. Had it been a cold cream or a headache cure his course would have brought about the same results. That is a very curious thing, if you stop to think about it. If the businessman starts to think about it the result may undo him wholly. Yet lots of them do think about just such things.

In so doing they realize that such products as toothpastes, bleaching creams, headache remedies and many other things are at worst harmful and at best superfluous. It begins to seem a little foolish to them to devote their lives to promoting the manufacture and sale of such trash.

Normally a traveling salesman is not the kind of fellow to whom you would look for vivid exhibitions of social awareness. But this one carried Byron along to read on trips and he frequented art galleries knowingly. In time these cultural deviations affected his attitude towards his way of making a living and one luckless day he began to ask himself:

"Why should this poor dope buy the junk I'm trying to sell him? For it is junk and really should never have been made in the first place. It is no good for anything and besides it falls to pieces in no time. What right have I to waste other people's time the way I do? Why don't they throw me out bodily as soon as I begin my patter?"

That was fatal. From that day on he couldn't sell junk. He had to find commodities or devices in which he thoroughly believed and which he was positive were useful and beneficial; only these could he sell. But it is mighty hard to make a living that way and his income tottered.

It is extremely difficult to adjust business logic to social logic. The effort drives some businessmen to psychiatrists. One of these was not long since induced to part with his experiences along with the price of an excellent luncheon.

Even in his youth he had had very high ideals. He decided to study medicine. But, since he couldn't stomach the business of gouging his living out of people who were flat on their backs, he decided to start some enterprise to supply a living while he practiced free. It so happened that the medical school was full up the year he wanted to enter so he decided to found his business during that year and take up medicine thereafter.

He had displayed considerable talent for business even as a youth and had actually accumulated sufficient capital at eighteen to launch a business. But he found that peddling stuff in high school with the assistance of fellow students and running a business of his own were two different affairs entirely.

At the end of the first year he was in debt and he had to stay in business a little longer to come out even. He ended up by staying in business, a form of public relations work, and never studying medicine. But vague dissatisfaction gripped him. He was very busy and he was using his brains constantly, and he became successful financially, but the whole thing seemed definitely silly to him.

He kept saying: "I shouldn't be in business. I should be in something socially useful. It isn't socially worth while for me to put in the time, effort and talent I do promoting this or that crazy gadget or appliance. Many of them have no real value; some of them are socially harmful. Most all of them just might as well not exist insofar as the progress of the human race is concerned."

This line of reasoning was bound to drive him almost crazy. It induced him to ask advice of any friends who looked as if they might be capable of giving it, and all of them were only too glad to do so, of course. Then he went to a psychiatrist. The doctor listened to his sad story and then remarked:

"Young man, this is a business civilization. You simply cannot escape it. It is a world also in which there are many kinds of logic, some of them so rigid that, based on odd basic premises, they send people to lunatic asylums. There are also things that might be called social logic and business logic. When you are in business you must use business logic. That is rendering unto Caesar the things that are Caesar's. But there is also society, or God, or what have you to consider.

"That is the place for social logic. Whether you want to promote human progress for religious or for purely secular reasons doesn't matter. The thing to do is use business logic in business to make money and then use some of the money in the effort to change the business civilization to something you would like better."

Thus, while a whole lot of his business might appear silly when measured by standards of social or economic efficiency, it made a lot of money and he could sanctify the lucre by using some of it to forward social ends near his heart. That worked out quite well for him, and it is about as sensible a thing as a businessman can do if he has the misfortune to be intelligent and socially conscious.

If one persists in approaching business rationalistically and realistically instead of irrationally and sentimentally, he is almost bound to fail. Money making is the primary goal here, not social service. Of course, if your product is so utterly abominable that you can't make money on it, you have to change that, but this consideration is secondary. Then, with the aid of business organizations, you can develop the gospel of service, learn the litany, recite the articles of faith with due regularity and not feel too badly about it.

No one individual can change our entire system of business civilization by denouncing it, nor can he hope to make a good living if he violates sound business logic while engaging in business. In business terms it is very sensible to throw the entire weight of your being into the manufacture, promotion and sale of an ordinary dentifrice; in terms of social logic that is so asinine as to appear almost

insane. But the businessman must act in consonance with social logic in another realm of his being.

Some years ago an elderly gentleman conducted a highly boisterous Sunday afternoon forum in a great industrial city. His control of the audience was amazing and he ran the affairs admirably without ever appearing dictatorial or despotic. When one looked over the list of his speakers for forty Sundays in a row it was impossible to guess his faith, for they varied all over the lot in their attitudes, from extreme radicals to extreme conservatives, with all shades of religious opinion thrown in.

Further investigation disclosed the curious fact that the old gentleman was indulging himself in a little benevolent altruism. He was seeking expiation of his sins as a businessman. This was a process of public atonement which compensated for a great deal of wrong he considered himself to have done in the past.

When quite young he had graduated in pharmacy and had become a corner druggist. He leased and finally bought the building in which he had his store and his family lived upstairs. Then, becoming reasonably prosperous, he built a home elsewhere and the family moved, leaving the upstairs vacant. Since he was unable to rent these rooms he tried to think up some other use for them as their idleness irked him.

Finally, in desperation, he decided to start a little manufacturing business of some sort up there and he began to tax his brain for something to make and sell. He naturally consulted a common formula book used by druggists generally and, in the end, he selected the formula for a bleaching cream which contained mercury.

Actually the cream was injurious, but such details were little considered those early days and, besides, he was going to make only a little of it. It wouldn't injure many people. So he gave it a sweet, seductive plant name, hired a man and a boy, and began to put up the cream and sell it in a small way to close big pores and remove freckles. The thing went along nicely enough until an advertising man stopped by one day to entice him.

He didn't really want to advertise the cream but the man was persistent and he was busy so he put his name to a contract and thought little more about the matter until orders began to flood in. The stuff began to sell furiously all over the city, outside the city, all over the State, then in other States. That irked him still more

than the empty rooms had but there was nothing he could do about it.

He knew the cream had no special virtue. The formula was a very common one. Other creams of the same formula sold hardly at all under names different from the one he happened to think up. Other creams still, far superior in quality, sold poorly. He began to feel extremely silly. What was worse, the business entirely outgrew the rooms over the store and he had first to move it into another building, and later to build a special handsome edifice to house it and the litter of cosmetic progeny it spawned.

Worse still, he didn't want to get rich because he had always thought that rich people were probably sinful. But, very much against his will, he went on and on into great wealth, though he lived just as frugally as he could. In the end the old gentleman—he was a kindly soul who wore elastic-top boots—became repulsively rich and the Government began to crack down on his cream as a menace to health.

So he changed the formula, removing all the mercury, and it sold just as well as ever and performed the same identical miracles for the ladies that it always had. But he felt degraded and embittered at having become wealthy in a manner so scandalous. So he cast about for a method of compensating society for his transgression. He sought remission of sin. He began to read books and, when he came to single tax, that attracted him.

He therefore decided to sell his business and devote his money to spreading the economic doctrines of Henry George. This he did. The forum was an afterthought. It was founded purely for purposes of intellectual stimulation and not to propagandize any doctrine whatever but to give all an equal chance. Thus this businessman effected a reconciliation between business logic and social logic. This gave him great peace in later life and he died a happy man, while another concern manufactured his worthless cream and made fabulous sums thereby and bothered not at all about social significance or human progress.

Until you talk to a few of them in the sanctity of their real selves you will have no idea how many promoters, salesman and businessmen feel that they need to compensate for their evil way of life. Some of them give libraries, others endow hospitals or universities, a few publish periodicals devoted to poetry, psychology, or economic hetero-

doxy. Thus they seek to expend some of their ill-gotten gains for benevolent social purposes.

Their reforms may never get very far, but they do justify the existence of their benefactors and help reconcile business and social logic. Actually it is not that they have been deliberately sinful in business but that business logic is infantile as compared with the logic known to the intellect. It is rather a shame that many people in other nefarious lines of activity, and they are legion, and not all businessmen by any means, cannot be induced to adopt such harmless and possible socially beneficial methods of making themselves feel respectable.

Vitamin K in chewing gum is claimed to reduce the incidence of tooth decay by 60 to 90 per cent according to a recent report from the Northwestern University Dental School. The vitamin apparently retards the formation of mouth acids which cause decay. The use of gum as a vehicle is considered desirable since it can be chewed after meals with little inconvenience and it also serves to drive the vitamin into those areas of the teeth most susceptible to decay.

AJP

The bite of the Black Widow spider can be treated very successfully with an injection of neostigmine methylsulfate and atropine. The bite, although not usually fatal with humans, may be exceedingly painful, spreading over a wide area unless treatment is established.

FIFTY YEARS OF ATOMIC ENERGY

By George Rosengarten, Ph. D.*

THE atomic blast that pulverized the earth and destroyed every vestige of man's invention in the neighborhood of Hiroshima, Japan, appears to have awakened in the mind of the average man an interest in this minute particle, the atom. For fifty years the scientist in all lands had been seeking for an answer to the question: What is an atom?

Atom means uncutable. A particle so small that the mind of man could appreciate nothing smaller. That was prior to 1896, for in that year Henri Becquerel, in France, experimented with uranium sulphate and found it to emit a kind of radiation which penetrated the black paper used to protect the photographic plates and produced thereon the shadow pictures of objects less easily penetrated. These rays he observed could pass through glass and sheets of aluminum or lead; in fact, they had many properties of the X-rays discovered a year earlier. The metal uranium was observed to produce even greater effects than its salts in the action on the photographic plate and in the discharge of electrically charged bodies. This was the first observation by man that within the atom of certain elements was a source of energy which was being automatically released.

The electron, which today forms the basis of that most important electronics industry, was discovered in 1897 by J. J. Thompson, in England. This minute negatively charged particle seemed most easily separated from the parent atom. The following year, 1898, Pierre Curie and his wife Marie, in France, observed that certain minerals containing uranium and thorium, such as pitchblende, were more active than the metal uranium itself. As their products became more refined they observed an increased activity more than 400 fold. They had found a new element which they named polonium. Later they found a second substance which differed chemically from the others but had a radioactivity 900 times that of uranium. For this new element they proposed the name radium. The year 1896 ushered in a period of renewed activity in the search for the secret of the atom and many new radioactive elements of high atomic mass were soon discovered.

* Department of Physics, Philadelphia College of Pharmacy and Science.

Albert Einstein, a German, as early as 1905 concluded from his study of the theory of relativity that mass and energy were equivalent and that further study of the radioactive elements might prove of great importance. This equivalence is expressed by the relation $E = MC^2$ where E is energy, M is mass and C^2 is the square of the velocity of light. This is a shorthand formula for stating that a kilogram of matter (2.2 pounds) if converted entirely into energy would produce 25 billion kilowatt hours of energy. The proof of this conclusion was to wait some forty years for its demonstration in the atomic bomb.

These investigations so far indicated that the atoms of the heavier elements like uranium, atomic number 92, thorium, atomic number 90, and radium, atomic number 88, were unstable and that some of these atoms exploded with release of energy much greater than observed in the ordinary chemical reactions. Three kinds of particles were given off by radioactive substances, the alpha particle, which was a charged helium nucleus, the beta particle, a negative electron, and the gamma radiation, a photon something of the nature of the X-rays. For example, an atom of radium of atomic mass 226 might at any moment break up and expel an alpha particle of mass 4 and produce a new atom of radon of mass 222. Then follows a long series of atomic disintegrations each one lasting only a short time until finally a stable form is reached. This in short is the theory of the transformation of matter as observed to take place spontaneously with elements of high atomic mass. Radium in the pure state has an activity several million times that of uranium. Nothing, at that time, was found to alter the rate of this disintegration of the heavier elements and the lighter elements appeared to be in a stable form.

All this was changed in 1919 when Rutherford, in England, observed the artificial disintegration of the atom of nitrogen. By using the high speed alpha particle as a projectile he could cause the nitrogen atom to expel a positively charged proton, the hydrogen nucleus, and become an atom of oxygen. The probability of such an encounter was at that time about 1 in 1,000,000. Soon other elements suffered disintegration in other laboratories in different parts of the world and the probability was much increased.

The discovery, by Anderson in America, of the positron, a positively charged particle of about the same mass as the electron, added another fundamental particle of matter to those already discovered.

About the same time Bothe and Becker in Germany discovered that the alpha particle from polonium, falling on beryllium, caused the emission of very penetrating radiation which Chadwick in England showed to be an uncharged particle, now known as the neutron. What I have tried to briefly indicate is the fact that many workers in different parts of the world were successfully carrying on their research into the nature of the atom.

By 1932 the existence of four fundamental particles was known, the electron, the proton, the positron and the neutron. The atom consisted of a central nucleus containing protons and neutrons, nearly all the mass of the atom, and surrounded by planetary electrons. The number of positively charged protons determines the electric charge on the nucleus and the atomic number, the additional number of neutrons being necessary to account for the mass of the atom and the number of negative electrons equal to the number of protons to render the atom neutral. The greater part of the atom however was empty space, thus making the chance of a direct hit on the nucleus by a bombarding particle highly improbable.

The conversion of mass into energy and vice versa was being observed on a small scale. When an electron and positron combine the two masses disappear and radiant energy results or when a photon of radiant energy disappears an electron positron pair results. The study of artificial radioactivity resulted in the discovery of hundreds of isotopes, elements having same electric charge and therefore the same chemical properties but having slightly different mass We are most interested at present in the isotopes of uranium known as U 235, U 238, U 239, and of these the U 235 is the most active when bombarded by neutrons. The nucleus of the U 235 atom will split up into two fragments, lighter elements of approximately half the atomic mass and release an enormous amount of atomic energy. This soon became known as nuclear fission.

In 1939 Fermi suggested the probability of a chain reaction resulting from this so-called "fission" process. Perhaps a number of neutrons would be given off which in turn would cause other U 235 atoms to break up and release energy. What is a chain reaction? Consider the combustion of coal or the slow burning of a piece of paper. Once started the burning coal releases enough heat to ignite more coal and so on. If such a process could be started in the uranium or other elements the release of atomic energy was

assured. It was such a state of affairs that existed in 1939 and the importance of atomic energy as a weapon of offense was considered.

The United States Government official report on the Development of the Atomic Bomb by Henry D. Smyth of Princeton gives the theory and practical difficulties involved in this the most mammoth scientific effort of the war. Many of the greatest scientists in this country and Great Britain were engaged in the research and development of this project at a cost of about two billion dollars.

The isotope of uranium, U 235, when hit by slow neutrons, disrupted with the greatest probability. Fast neutrons from uranium fission could be slowed by the use of moderators such as heavy water or carbon. Because every neutron will not produce fission, some of them escaping and others being absorbed by impurities, a small amount of material will not maintain a chain reaction. More neutrons must be produced than fail to produce fission. A critical size of bomb or "pile" results. The apparatus in which the chain reaction resulting from the release of controlled atomic energy is produced has been called the "pile."

Experiments with a radium-beryllium source of neutrons placed in a graphite pile showed that of the neutrons so produced some escaped and some produced fission. Only as the pile was increased in size to the critical mass did the number of neutrons producing fission equal the number escaping or captured, thus showing the possibility of the chain reaction and the atomic bomb became a certainty. Pure materials were necessary, requiring time and the expenditure of large sums of money for production.

The isotope U 235 which is the most effective in producing atomic energy occurs only one part in 140 in the uranium. The U 238 isotope is the most abundant and isotopes are separated with difficulty because they have the same chemical properties. Physical means, using the slight difference in mass, made possible the separation by diffusion or by an electro-magnetic process called the mass spectrograph. All particles having the same mass moved in the magnetic field along the same path and collected at the same point. Such a plant was constructed at Clinton, Tennessee, and was the first to produce large quantities of U 235.

Two new elements, neptunium, atomic number 93, and plutonium, atomic number 94, were produced as a result of these experiments and it was thought that this new element plutonium might undergo

fission and release atomic energy. This was later found to be a possibility. Two materials, uranium 235 and plutonium 239, appear to be possible sources of atomic energy. Plutonium is a different element from uranium and can be separated by chemical means. This would be a simpler process than the separation of the isotopes U 235 and U 238.

In building up a chain reacting pile, graphite bricks are piled up in layers and slots left for the uranium cylinders and neutron detectors. To control the action certain neutron absorbers are used in the form of strips of cadmium or boron steel. At each fission of a uranium atom 200 million electron volts of energy are released, and the production of one kilogram of plutonium per day will generate 500,000 to 1,500,000 kilowatts of energy. Such a plant was constructed at Hanford, Washington, and the cold waters of the Columbia River were needed to absorb this energy. It is by the production of this enormous amount of heat energy that commercial use may be made of controlled atomic energy.

Those of us who are astronomically minded see in these experiments the possible answer to the question: what is it that keeps the sun and stars so hot? Perhaps a chain reaction of some kind is going on, releasing great amounts of energy while numbers of the atoms are undergoing a transformation. What the possibilities of the use of atomic energy by earth-minded individuals may be we will not even predict, leaving that to the scientific development of the next fifty years in this most important field of atomic energy.

ATOMIC POWER AND DISEASE*

By Ivor Griffith, Ph. M., Sc. D., F. R. S. A.**

LADIES AND GENTLEMEN:

I HOLD this occasion in such esteem and importance that I depart from the lackadaisical habit of extemporizing my post-prandial remarks and I have, accordingly, recorded them, whether they are worth it or not, in what the chemist would call a deposit of carbon on cellulose. This city in which we are foregathered is notable among the metropolises of the world as a center of activities in health and welfare. From its earliest colonial days, Philadelphia has remained clinically true to the meaning of its name, "the City of Brotherly Love." It has been in many aspects of its services not just its brother's keeper but rather its brother's brother. Some of our astringent and bilious friends have recently charged that Philadelphia is losing ground as the center of medical culture and medical research but those who really know how to differentiate ballyhooed, political, pigeon-minded medicine from genuine constructive policies and services in fundamental medical practice, research and education know that Philadelphia's record in this field still stands high.

And so, in the traditional Philadelphia manner, here we foregather, well-intentioned, to concentrate our minds upon the greatest menace in the field of public health, namely, cancer.

I am usually fearful of statistics but more fearful of statistical data "tandemed" to imagination. Vital statistics in connection with cancer in particular, are more realistic today because the diagnosis of the disease is better done. On the other hand, a new factor has been added. Americans live longer than ever they did before and death is getting to be more objectionable than ever. In looking over the causes of death during the past month in this city I find that cancer was responsible for 300 during the month or approximately 3,500 during the year. The nation-wide figure is about two-thirds the Philadelphia incidence. And we must recall that many afflicted

* Address delivered before the Annual Meeting of the Cancer Forum of the Lankenau Hospital, Philadelphia, at the Bellevue-Stratford Hotel, November 26, 1945.

** President, Philadelphia College of Pharmacy and Science.

rustics come to the city to die. Philadelphia's population is about one-tenth of one per cent of that of the whole world, which suggests that if cancer prevails as a fatal disease the world over in the proportion in which it prevails in Philadelphia, the annual incidence of cancer death in the world is 3,500,000 or about 2,500,000, if we use the cancer mortality figure prevailing in the United States. Of course we are taking much for granted when we make this statement, for it has been rather sensibly stated that cancer is a disease of civilization or is at least greatly abetted by human existence such as it is today in many pampered, pie-eyed portions of this planet. Medical literature has proven the existence of this disease in practically every part of the world and all through man's occupancy of earth from the Piltdown and Java man to the current *homo sapiens,* although with greatly varying prevalence. It is, however, an accepted viewpoint that the inhabitants of congested cities in civilized countries suffer in greater numbers than do dwellers of the countryside and certainly more so than the uncouth, uncultured and the unread denizens of the jungle and the wilderness. There must be a reason therefor. Here in civilized Philadelphia our existence is quite unlike that of the long line of our ancestors who still control our basic functioning, however little we may wish to admit it, and no population can shed itself overnight of the good or bad habits of the generations that preceded it.

Early Philadelphians, in addition to whatever else they drank, drank good water. We drink essence of slime, sludge, muck, filth and sewage, physically and chemically treated so that it ultimately flows down our gastronomic chute an unesthetic unnatural fluid but, thank heavens, antiseptic and free, at least, of pathogenic bacteria. By way of a diversion, I am informed, and inform you, that most of the offices in our municipal headquarters serve, not Aqua Spigotta, but distilled water at their drinking fountains but as Mr. Kipling said, "That is another story."

We live and have our being in an atmosphere surcharged with industrial by-products in the way of gases, vapors and particles, many of them carcinogenic. Much of the food that we eat, and particularly the staff of life, is bleached to an anemic inanity. Until recent years, our cooks tortured our vegetable foods until most of their goodness disappeared. Now, you may ask, what have all of these malpractices, if they be malpractices, to do with cancer, and my answer is that if

cancer is a disease of civilization, irrespective of its intimate causative factors, it is well to search for the differentials between the primitive and the more civilized way of living in order to learn how we might sensibly return to the kind of an intuitive, instinctive, disciplined existence, more compatible with the basic functioning of our bodies and less seductive to disease.

In sheer protoplasmic mass, man's brain today is larger than his need, and because of it, or in spite of it, man is no longer an instinct guided, basic being, but an unhealthy, spoiled, convention-bound prodigy among animals. No longer does he live close to Nature and listen to her counsel, but he has become host to innumerable practices and parasites; his kingdom tumbles to earth with the onslaught of creatures too small to be seen; his fuel and food swell to gastronomic pride but swill their toxic treason through his system. The faults of his grandparents, though fewer than his, add to his own mismanagement, and as the end approaches, instead of calmly, smoothly sliding to his soil estate, he, childlike, waits in pain and misery for death to fetch its soporific rattle.

Eyes, which at sixty should still give clear vision, vainly stare through solid cataracts, or ogle through spectacled harness. Too often, toothless and hairless, except for periwig or ivories, the old man creeps at evening to his rocking chair and rocks to the tune of cracking arteries.

Man has come to be an unnatural, convention harnessed, harassed and therefore partly spoiled animal. Did you ever see a cow gawking through a pair of silly spectacles? Does old Dobbin ever need a set of china teeth to grind his morning oats? Would an elephant live as long as he does if he had some human habits—smoked a pipe, wallowed in vitriolic cocktails, drank his fill of tea and coffee, wore corsets, rarely walked, dodged Fords, made after-dinner speeches, watched the ticker tape, paid his income tax, painted his face with kalsomine, disembowelled himself with crank case oil, failed to use pepsodent and saw his dentist only twice a year?

Of course not!!!

Yet I say to you that man, the intelligent thinking being, were better in some respects if he were incapable of so readily changing his destinies—if, like his animal kind, he listened more to silent, cellular impulses, rather than to the dictates of custom and convenience.

So much for that aspect of things.

I hesitate to introduce consternation into an atmosphere where concert of mind and heart in a dedicated cause is the order of the day and, yet, I just can't resist the urge to tell you, and oh so emphatically, that we are all of us now the willy-nilly children of a totally new epoch in the history of this earth. Without speculating over the age of this planet or over the dominion of *homo sapiens* upon it, it can be said without fear of contradiction that this is its *saddest, most terrifying* hour since creation and all of this because we have learned to release the power of the atom.

For generations scientists have looked forward to this achievement, mathematicians have calculated that it could be done, physicists, in hypotheses and in practice, have been nibbling at the project for many years; yet, it remained for the world's most prayerful, most charitable, most decent democracy to concentrate all its forces upon a solution of the problem and then to apply it, at once, to the dreary, deadly business of atomizing human beings. Mind you, now, this is not in criticism of any method whereby a war was shortened and human lives were spared; but it does seem paradoxical that we of America were responsible for staging this bloody *première* of the greatest material power ever at man's command.

I do not wish to pose as one who knows his nuclear physics well enough or the program of this government in its Manhattan Project well enough, to compete with the information given to the public by senators and congressmen who have become atomic experts overnight through concentrating on their newspapers. But anyone with plain horse-sense, harnessed to a sensible interpretation of current information, readily reaches this conclusion, namely, that atomic power as we know it now is homeopathic, insignificant, minuscular compared to what it will be ten years, twenty years, one hundred years from now—if there will be anyone around to use it. Even with our present uranium, plutonium, neptunium, heavy water, cyclotroned or otherwise fissioned to power, a simple multiplication in proportion its kernel of the atomic bombs already used multiplies in proportion its devastating power. I honestly believe that even in this elementary day of our destructive application of atomic energy, we could construct a bomb large enough that if it were snugly dropped into the throat of Vesuvius, or Fujiyama, it would split the world in half. No wonder our legislators want to keep this horrid business a secret;

yet, the truth of the matter is that it is no secret. Enough authoritative literature under such authorship or signature as Dr. Smythe of Princeton and General Groves, himself, is available to the world and any nuclear physicist, in any country, can derive enough information from these and other sources to undertake, if carnotite and pitchblende be available and if enough money be available, the manufacture of some type of atomic bomb. Furthermore, the future will not have to depend on the high electron, neutron, proton elements for atomic energy, for atomic power may be obtained from even the simplest of compounds and elements.

In order to bring further consternation into your thinking, let me give you as a fact that it is already possible to fire a jet propelled plane, whizzed to its destiny by atomic power and guided to its landing spot by electronic forces, there to land unmanned and to time-explode its charge of atomic explosive. Furthermore, you will be hearing, shortly, of atomic power in torpedoes and in smaller arms designed especially for such operation.

I repeat, we are in the kindergarten stage of the development and uses of this highest potential ever made available to man, a potential which has irrevocably changed the place of man on earth and indeed the status and security of earth itself. And one of the paradoxes of the exercise of the destructive power of the atomic bomb rests in the actual fact that the more or less cultured inhabitants of the large cities of the earth are, from now on, in daily danger of extinction; whereas, the crude and uncivilized inhabitant of the jungle is relatively safe. We need not think that because of our industrial power or of the industrial power of the larger countries and empires we shall have control of the atomic bomb or other manners of using atomic power. It may well, indeed, fall to the lot of a small country to come upon the secret of a much cheaper, a much more deadly, a much more concentrated, harnessed atomic or cosmic energy than will be known elsewhere and it can be further postulated that such a country could secretly develop the magnitude of that power for destruction in such a way that nowhere on our much-confused earth would there be a safe spot for humanity.

You may ask, and rightly so, what all of this has to do with the human and humane subject and campaign which have brought us all together today. Firstly, all over the world, there are thousands of dissociated projects researching into the various aspects of cancer.

Thus far, only a minimum of cooperation has existed between these undertakings. Some are completely chemical in their researches; some, completely clinical; some, physical; and some, believe it or not, metaphysical. Doctors, chemists, physicists, bacteriologists, mathematicians, statisticians, homeopaths, allopaths, several other paths and a few detours, are all hodge-podging this physiological crusade and with a minimum of coordination and cooperation. Good philanthropists and some others angry at the tax give freely of their money to these unrelated researches. The government of the United States, through organization and with money, has managed to solve atomic fission, although solution of the problem took 125,000 people, over two billions of dollars and months and months and months of weary researching. Why? "Concentration and coordination" made this grave and epoch-making discovery possible.

Ladies and Gentlemen, I submit to you that this most deadly of all human enemies, cancer, could be wiped from the face of the earth if the same sort of intelligent, coordinated insistence be exercised in this direction as was used in the case of the atomic bomb. Free enterprises in research need have no fear of being submerged or extinguished by Government assistance. I repeat that what we need are "concentration and coordination" and these things can be had without, in any sense, impairing or impeding the progress of organizations, such as this, or hindering splendid researches such as those now privately conducted.

Now there is nothing new in the tie-up of atomic fission and therapy, for long before the militarists sought to harness atomic power for devastation, scientists had been using it experimentally and otherwise in connection with disease.

This may be a wild conjecture on my part but it is my firm personal opinion that the destructive forces released through the fission division of uranium-235 and other elements and isotopes, these released frantic neutrons and the emitted radio-active *beta* and *gamma* rays may ultimately throw into the discard the deep X-ray and natural radium and radon for the therapeutic destruction or stoppage of the malignant runaway growths of cancer. The old technique of surgically inserting radium capsules or needles into tissue, allowing them to remain until the growth is successfully erased, which may take days or weeks, and then removing the needle surgically is a costly and painful procedure. It is quite probable that atomic fission

has already made available temporarily activated materials which may be introduced into malignant tissue and left there to spend their radio-activity wisely and well and with no need for their ultimate removal. Furthermore, there is sufficient progress in the field to indicate that it may be possible to develop tracer radio-active materials which can be introduced into the blood stream and which will travel around the body unceasingly until they spot the malignancy. There they will automatically stop, fix themselves to the tissue and begin their work of local cell-growth retardation.

If, as it has been stated, cancer is not a germ or a virus disease but one of metabolism and aggravated by antagonisms—and I mean just that—since cancer's greatest ally is worry, then we can look for great assistance from these tracer elements in searching for the cause of cancer and possibly in eradicating it. Already iodine, radio-activated, has been traced in its wanderings through the labyrinthine maze of body cells, finally and logically coming to rest in the thyroid gland, where body iodine is stored and issued and indicating its radio-active presence by buzzing and clicking when a Geiger counter is brought into the neck region. The path of phosphorus may be traced and so indeed may the purpose of many other elements in the body be traced into a more logical understanding. This type of application of atomic fission and atomic energy already presages the dawn of a new day in understanding animal physiology. Furthermore, it is already known that the electron bombardment of certain micro-organisms changes their strength and modifies their characteristics. Already, *Penicillium notatum,* the mold that yields the wonderful bacteriostatic agent, penicillin, is made to yield more of the active substance by developing mutations through the application of atomic bombardment. Science knows, now, well over a hundred carcinogenic chemicals, in other words, materials that produce cancer. By replacing the normal atoms of these compounds with radio-active isotopes, these carcinogenic substances could possibly be followed in the experimental body by a tracer method and the manner in which they produce cancer may conceivably be discovered and then the manner of its prevention or cure.

It occurs to me that I have traveled two avenues in this brief address; one leads to the concept that unless man cultivates the decencies, unless man lays a greater stress upon the spiritual and constructive rather than upon the material and destructive, his Frank-

ensteinian foolishness may not only bring him to extinction, but change his erstwhile earth to an incandescent mass. Henceforward, man much more importantly needs to harness man rather than the atom.

Our other concept is thoroughly anchored to the belief that atomic power, now in its infancy, may, with well-disciplined growth, develop into the greatest industrial and welfare boon that the world has ever known, and particularly in improving our knowledge of physiology and of the etiology and treatment of cancer and other diseases.

Ladies and Gentlemen, I ask you to think seriously over the situation. Every human being, the world over, has a stunning challenge according to the measure of his resources and responsibilities to think and to act decently and straightforwardly so as to save mankind from its own perversities. I give you this prayer as my concluding thought: "Grant us all, Oh Lord, a clean mind and a clear eye to lead us to give our share toward none else than a policy of determined decency in the sensible exercise of these, our new God-given powers."

A recent article in the United States Naval Medical Bulletin reported the treatment of 1265 cases of pneumonia without a single death. Sulfadiazine and penicillin in combination were considered to be the optimum therapy and careful laboratory control of all patients for leukopenia is advised where sulfonamide is given.

SELECTED ABSTRACTS

Cobra Venom in the Treatment of Angina Pectoris. A. S. Freedberg and J. E. F. Riseman. *New Engl. J. Med. 233,* 462 (1945); through *Med. Times 74,* 23 (1946). Observations made on twelve cases of angina pectoris treated by the intramuscular injection (deltoid muscle) of cobra venom revealed that the most effective dosage was three injections of ten mouse units (1 cc.) each on the first day and then one injection daily for seven days. Biweekly maintenance doses were necessary thereafter.

The patients, nine of whom had been under observation for two years or over, were classified into groups as follows: Group 1, "marked reactors" who responded well to various forms of treatment, including nitroglycerin; Group 2, "moderate reactors" who showed only moderate response to therapy; Group 3, "non-reactors" who failed to respond to any of the usual methods of treatment. By means of repeated standardized exercise-tolerance tests the amount of work which could be performed by each patient was established.

In seven patients, including three of Group 3, there was a 25 to 75 per cent increase in exercise tolerance after treatment. In two cases of Group 3, cobra venom was the only drug of fifty-seven tested that produced demonstrable clinical improvement. Electrocardiographic studies indicated that the drug does not affect the underlying processes that are responsible for the angina. It apparently acts by preventing the patient from feeling pain, and may be used as a substitute for surgical procedures intended to interrupt sensory nervous pathways in such cases.

Inhibition of Growth of Mycobacterium tuberculosis by a Mold Product—the Effect on Pathogenic Human Tubercle Bacilli. I. E. Gerber and M. Gross. *Science 103,* 167 (1946). The *in vitro* activity of mycocidin, a mold product described by the authors in a previous publication, was studied on two strains of human pathogenic tubercle bacilli isolated from patients with advanced pulmonary tuberculosis.

As a working standard, the authors have defined a unit of mycocidin (M-unit) as that amount of the preparation of the mold extract per ml. of Long's synthetic medium which will completely inhibit the growth of a standard inoculum, directions for the preparation of which are given in this paper.

In culture experiments, tubercle bacilli either in clumps weighing from 1 to 2 mg. or in suspension were exposed to mycocidin in Long's synthetic medium for various periods of time, usually seven days. The bacilli were recultured and incubated, and their growth was observed weekly, the final reading being made at forty-four to fifty-seven days. The minimal amount of mycocidin necessary for complete inhibition of the RES strain was found to be approximately 0.515 M-unit per ml. of liquid medium and 0.625 for the CS strain.

Inoculation studies performed on guinea pigs indicated that mycocidin is both bacteriostatic and bactericidal for the human tubercle bacillus. From 0.5 to 0.6 M-unit per ml. was found to be necessary for bactericidal effect upon 1 mg. of this organism.

Further work is in progress on the isolation and purification of the active principle, and its activity against other organisms is being studied.

Buckwheat as a Source of Rutin. J. F. Couch, J. Naghski and C. F. Krewson. *Science 103,* 197 (1946). In an effort to find an economical source for rutin, a flavonol glucoside which has been demonstrated to be effective in the treatment of increased capillary fragility associated with hypertension in man, the authors examined a number of plants for their content of this principle. Fresh buckwheat was found to yield considerably greater amounts of rutin than had been reported by earlier investigators; the average content, on the moisture-free basis, was 2.07 per cent for the whole plant (exclusive of roots), and 2.50 per cent for the leaves and blossoms.

The rutin content was found to vary with the age of the plant. On an over-all basis, one acre of buckwheat would produce 14.2 pounds of rutin in twenty-six days after planting, and 50.25 pounds in forty days.

It was noted that a loss of rutin occurred when buckwheat was dried for prolonged periods, especially at moderate temperatures.

Some Experiments on Penicillin. R. C. Parnaby. *Pharm. J. 102,* 55 (1946). In order to investigate the reported destructive effect of alcohol and of methylated spirit (methanol) upon penicillin, the authors carried out a series of tests against *Staphylococcus aureus* in agar plate cultures.

Penicillin solutions in sterile distilled water, in 2 per cent alcohol, and in 25 per cent alcohol were prepared in a concentration of 500 units per mil, stored in a frozen condition for some time, and then stored at 7-9° C. for twenty-eight days. The concentrations used in the potency tests varied from 0.5 to 1 unit per mil. It was found that the alcoholic solutions were as stable as the aqueous ones; about 50 per cent of the activity was lost under such storage.

Similar results were noted in experiments on penicillin in 2 per cent industrial methanol, but much greater destruction of the antibiotic occurred in 25 or 50 per cent methanol.

Solutions containing 500 or 1000 units of penicillin per mil in 90 or 50 per cent sterile glycerin were found to undergo slightly more deterioration than aqueous solutions when stored at 7-9° C. for fourteen or twenty-one days.

Penicillin lozenges containing 500 units each, prepared with the B. P. lozenge mass, lost more than 50 per cent of their activity after three weeks of storage in the refrigerator. Further tests on another batch in which the tincture of tolu was omitted indicated that drying in the refrigerator was preferable to drying at room temperature.

Penicillin calcium lozenges supplied by the Government were found to require one and one-half hours to dissolve in the mouth. Saliva tests against *S. aureus* indicated a good inhibitive action on the organism.

Storage tests performed on penicillin pastilles prepared according to the formula of Martin, with the exception that twice the amount of gelatin was used, showed that a large proportion of their activity is lost after keeping them for seven days at 7° C. They retained only slight activity after storage for fourteen days at this temperature, and none after fourteen days at room temperature. The authors recommend penicillin lozenges as superior to gelatin pastilles.

Penicillin sodium in sterile normal saline solution, 1000 units per mil, was stored in a frozen condition at a temperature below 0° C. for twenty-eight days. The amount of deterioration at the end of this time was approximately 50 per cent.

The Clinical Toxicity of Thiouracil: A Survey of 5,745 Cases. W. Van Winkle, Jr., S. M. Hardy *et al. J. A. M. A. 130,* 343 (1946). The authors present an analysis of clinical data reported in a questionnaire by 328 investigators who treated 5,745 cases of hyperthyroidism with thiouracil.

The drug was found to be effective in the treatment of thyrotoxicosis and possibly thyroiditis, but of no value in conditions not associated with hyperthyroidism. It appears that the optimum dosage is 0.4 Gm. per day, in divided doses; after the symptoms are controlled or the basal metabolic rate has been reduced to normal, the daily dose should be diminished to 0.1 or 0.2 Gm.

It was observed that patients who had received iodine therapy prior to the administration of thiouracil frequently failed to respond immediately to treatment with the latter. It is therefore recommended that in such cases thiouracil therapy should be continued for from sixty to one hundred days before concluding that no response is to be obtained.

Some type of drug reaction was noted in about 13 per cent of all cases treated. Granulocytopenia occurred in 2.5 per cent of the cases, usually appearing by the twelfth week of treatment. No significant relationship between the incidence of this condition and the dosage of thiouracil was apparent. In this series of cases there were twenty-one deaths attributable to agranulocytosis, equivalent to a mortality rate of 0.4 per cent. It is recommended that thiouracil therapy should be discontinued immediately if this complication appears, and that massive doses (500,000 units per day) of penicillin should be administered parenterally.

Leukopenia was seen in 4.4 per cent of the cases, usually within the first eight weeks of treatment, and not related to dosage.

In 2.7 per cent of all cases drug fever occurred, usually within the first four weeks of treatment, and not related to dosage. Reactions occurring early in the course of treatment tended to be more severe than those occurring later.

Skin reactions had an incidence of 3.3 per cent. Of these, urticaria was the condition noted most frequently; rashes of a papular, morbilliform, macular, or acneform type, and several other dermatoses were also reported. None of these were considered to be serious, but caution is advised in continuing thiouracil therapy in their presence.

It was the opinion of three-fourths of the investigators that the incidence of adverse reactions following thiouracil therapy was less than the incidence of complications from other methods of treatment used at present.

Penicillin Cream. H. O. Irving and H. M. Forbes. *Pharm. J. 102,* 54 (1946). The authors recommend as a convenient means for the addition of penicillin solution to the base a device consisting of a 100 ml. separatory funnel and a 25 ml. burette.

The stem of the funnel is shortened to about one inch, and is inserted through a piece of rubber tubing, extending about one-fourth inch beyond the latter. The stem and tubing are then placed inside the neck of the burette; in order to prevent an air block, a small slice of rubber is cut from the tubing.

It is claimed that the apparatus can be easily sterilized and that aseptic conditions can be retained. For the preparation of large batches of material, this apparatus is stated to be more satisfactory than a syringe as a measuring device.

Use of Radioactive Sodium as Tracer in Study of Peripheral Vascular Disease. B. C. Smith and E. H. Quimby. *Radiology 45,* 335 (1945); through *J. A. M. A. 130,* 243 (1946). The authors studied the circulation of the blood in more than 200 patients with peripheral vascular disease by injecting intravenously a few cc. of isotonic solution of sodium chloride containing the desired amount of the radioactive isotope Na_{24} and following the course of the tagged atoms by the use of a Geiger-Müller counter.

This method is stated to provide a simple and objective means of determining the blood supply to an extremity through either the main arteries or the collateral circulation. It was found to be of value in ascertaining the site of amputation at which healing might be expected. In this connection justification was observed for the clinical attitude that in many cases of amputation for gangrene in peripheral vascular disease the knee joint can be saved.

Inasmuch as no toxic material is injected with the sodium, and the dose of radiation is considerably less than 1 roentgen for each test, the method is applicable to following the progress of the disease or determining the efficacy of therapeutic measures.

SOLID EXTRACTS

A new strain of penicillium has been developed at the University of Wisconsin which will greatly increase and possibly double penicillin production. This strain, known as Q 176 was produced by ultraviolet radiation which causes mutation in the organisms. It produces almost 1000 units/cc. of culture as compared with 300-500 units/cc. from ordinary cultures now in use. Originally only 2 units/cc. were obtained from the early cultures used in England in 1940. With the increasing demand for penicillin this new strain now in use by the major producers should raise considerably the output.

AJP

A new type of emergency sea suit for aviators, made of artificial fur, was developed during the war at the I. G. Farbenindustrie plant at Hoechst, Germany. It is claimed by the Germans to have enabled aviators to keep warm in cold sea water for about nine hours.

Each hair of the artificial fur was coated with a chemical which would froth with air bubbles upon striking sea water. The chemical preferred by the Germans for this purpose contained the following ingredients: 24.4 per cent of a frothing agent; 41.46 per cent sodium bicarbonate; and 34.14 per cent citric acid.

AJP

Distemperoid virus has been found quite effective in the treatment of this serious infection in dogs and foxes as well as in prophylaxis. It is prepared by "biological modification" whereby it is passed through a long series of ferrets thus losing its virulence. It acts by "cell blocking" in which the harmless modified virus by combining with the susceptible cells blocks off subsequent invasion by the active virus causing distemper. If given early, recovery of infected animals is assured in most cases.

AJP

According to a recent article the barometer may be used to prognosticate on one's luck at fishing. During inactivity under low barometric pressure fish apparently go without feeding for considerable periods of time. If the pressure rises and is particularly rapid,

the fish feed avidly. Fish universally refuse to bite before a storm yet become active when the low pressure area lifts. Scientific fishermen will now add to hooks, flies, sinkers, etc., one compact barometer.

AJP

A new drug for hypertension has been announced by Frederick Stearns & Co. Chemically it is 1-(p-hydroxyphenyl 1) 2-isopropylaminoethanol. It produces a prolonged fall in blood pressure when given orally or parenterally. Its mechanism differs from most drugs used in hypertension in that it stimulates the vasodepressor mechanism rather that the smooth muscle directly.

AJP

The following data on the availability of streptomycin are submitted for those who may be questioned about it:

1. Streptomycin is available only for clinical trial until further notice.

2. All requests for the drug must be made of Dr. Chester S. Keefer, Evans Memorial Hospital, Boston, Mass. (Telephone: Kenmore 9200.)

3. Requests are to be submitted only by physicians, who should supply complete clinical data on their cases when applying and be willing to submit adequate records on the results of treatment.

4. Appeals for streptomycin should be restricted to infections that are not susceptible to the action of sulfonamides, penicillin or other therapeutic agents.

AJP

The theory has been advanced that the higher incidence of poliomyelitis during the summer may be due to the lowered metabolism that accompanies warm weather. Mice kept cold contract poliomyelitis much less readily than at summer temperatures.

AJP

Although penicillin plants of large productive capacity are in process of construction it will be some time before sufficient supplies are available for regular channels of supply.

BOOK REVIEWS

Poisons—Their Chemical Identification and Emergency Treatments. By Vincent J. Brookes and Hubert N. Alyea. 209 pages incl. index. D. Van Nostrand Co., Inc. Price: $3.00.

This is a practical work written primarily for police officers and others who are frequently called upon to recognize poison cases and to administer emergency treatment.

Mr. Brookes, one of the authors, is a member of the New Jersey State Police and his co-author is a member of the chemistry department at Princeton University. Together, they have compiled a fairly useful tabulation of various poisons giving the amounts known to have been fatal, the recognition or identification of the substance, antidotes and treatment.

The book will prove useful for the layman and others not required to study toxicology in its more highly developed phases but it could not be recommended as a textbook on the subject. As a ready reference pharmacists might find it useful.

Soap in Industry. By Georgia Leffingwell and Milton Lesser. 204 pages incl. index. Chemical Publishing Co., Brooklyn, N. Y. Price: $4.00.

The authors, both of whom are connected with the Association of American Soap and Glycerine Producers, Inc., have tried to present in this short volume a résumé of the various uses of the soluble and insoluble soaps in various fields. Although many new "soapless soaps" and synthetics have come into extensive use there are still many important applications of ordinary soaps for which no satisfactory substitute is available at a comparable cost.

A large variety of technical formulas are presented in the book illustrating the appropriate use of soaps in such products as cosmetics, insecticides, lubricants, polishes, textiles, etc. A discussion of the function of soap in these products as well as the suggested formula may prove useful to those interested in product development or product duplication in one of these technical fields.

A rather good bibliography is presented at the end of each chapter including many references to the patent literature.

NEW! CREAMALIN* NOW IN *capsules*

New form preferred by many patients

Supplied in convenient pocket or purse size

Ideal for patients on sugar restricted diet

Attractive
COUNTER DISPLAY
(2 dozen boxes of 24's Pocket or purse size)

For many years, CREAMALIN (Brand of Aluminum Hydroxide Gel) has been used in cases of peptic ulcer and gastric hyperacidity as an effective antacid. It has brought untold relief to sufferers who have used Creamalin in its several forms: liquid (unflavored, flavored, highly flavored, and with mineral oil) and tablets. Many users have expressed a preference for capsules. Thus, we now offer this new convenient form in boxes of 24 (especially designed for vest pocket or purse) and in bottles of 100.

The new Creamalin Capsules are presented commencing April 1, and for the entire month of April are offered at a special, liberal inducement.

Ask your wholesaler or your Winthrop representative for details.

*Trademark Reg. U. S. Pat. Off.

Complete WINTHROP CATALOG published in 1945-1946 American Druggist Blue Book and Drug Topics Red Book

Winthrop CHEMICAL COMPANY, INC.

Pharmaceuticals of merit for the physician

NEW YORK 13, N. Y. WINDSOR, ONT.

Introduced under Fair Trade

FOR FIRST AID

OFFICIAL 2% IODINE PREPARATIONS

Iodine is a quick acting, efficient germicide. It is preferred by many physicians in preoperative skin disinfection and in treatment of wounds, cuts, and abrasions. Official 2% Iodine preparations are especially recommended for first aid.

Official 2% IODINE Preparations

Recommended for first aid... Quick acting... Effective

MILD TINCTURE OF IODINE U. S. P.

Mild Tincture of Iodine may be prepared as follows:

Iodine	20 Gm.
Sodium Iodide	24 Gm.
Diluted Alcohol, a sufficient quantity	
To make	1000 cc.

Dissolve the iodine and sodium iodide in a sufficient quantity of diluted alcohol to make the product measure 1000 cc.

SOLUTION OF IODINE U. S. P.

Iodine	20 Gm.
Sodium Iodide	24 Gm.
Distilled Water, a sufficient quantity	
To make	1000 cc.

Dissolve the iodine and sodium iodide in 50 cc. of distilled water, then add sufficient distilled water to make the product measure 1000 cc.

IODINE EDUCATIONAL BUREAU, INC.

120 Broadway, New York 5, N. Y.

more uses mean more Profits!

SPRAY OR GARGLE

CUTS

WOUNDS

BURNS

'S. T. 37'

Antiseptic Solution

SHARP & DOHME

Sell a bottle of 'S. T. 37' Antiseptic Solution. It will mean *more profit* to you! . . . because this safe and effective germicide may be recommended to your customers *whenever* and *wherever* an antiseptic is required!

Sold as a spray or gargle for prophylaxis and treatment of throat infections, 'S. T. 37' Antiseptic Solution (per ounce) gives you *at least twice* the profit of similar antiseptics . . . and sold for the treatment of cuts, burns, and abrasions—the 12-ounce economy size brings you *at least four times* the gross sale of the usual "one ounce" antiseptic preparations. Sharp & Dohme, Phila. 1, Pa.

American Journal of Pharmacy

The American Journal of Pharmacy is the oldest continuously published scientific periodical of its kind in America, having been established by the Philadelphia College of Pharmacy in 1825. After the original issue there were three other preliminary numbers until 1829, when regular publication began. From then until 1852 four issues were published annually, with the single exception of 1847, when an additional number appeared. Six issues a year were printed from 1853 to 1870, at which time the Journal became a monthly publication.

Former Editors of the Journal have been: Daniel B. Smith, 1825-1828; Benjamin Ellis, 1829-1831; Robert E. Griffith, 1831-1836; Joseph Carson, 1836-1850; William Procter, Jr., 1850-1871; John M. Maisch, 1871-1893; Henry Trimble, 1893-1898; Henry Kraemer, 1898-1917; George M. Beringer, 1917-1921, and Ivor Griffith, 1921-1941.

Established and maintained as a record of the progress of pharmacy and the allied sciences, the Journal's contents and policies are governed by an Editor and a Committee on Publications elected by the members of the College.

Manuscripts should be sent to the Editor, who does not assume any responsibility in connection with the views or investigations of contributors of accepted manuscripts, other than to exercise general care in selection.

Contributors are allowed a reasonable number of copies of this Journal, free of charge, if applied for when the proof is returned.

Reprints, if desired, should be ordered when the proof is returned. The table below shows the *approximate* cost of reprints, the make-up of the pages to be identically the same as in the Journal. The actual cost may vary from the figures given, and will depend upon the amount of presswork, paper, binding, and other factors. Reprints containing half-tones may be expected to cost somewhat more than the rates given.

	2 pp.	4 pp.	8 pp.	16 pp.	Covers with Titles
50 copies	$3.50	$6.00	$10.50	$11.25	50 copies .....$ 5.00
100 "	4.25	7.00	14.00	15.00	100 " 6.50
250 "	5.25	9.00	18.75	20.00	250 " 10.25